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Applicant: **GENERAL ELECTRIC COMPANY**  
**1 River Road**  
**Schenectady New York 12305(US)**

(72)

Inventor: **Nelson, Linda Harmon**  
**720 Drexel Drive**  
**Evansville, Indiana 47712(US)**

(74)

Representative: **Catherine, Alain**  
**General Electric France Service de Propriété**  
**Industrielle 18 Rue Horace Vernet**  
**F-92136 Issy-Les-Moulineaux Cedex(FR)**

(54) **Polycarbonate resin compositions containing mould release agents.**

(57) A composition comprising an admixture of (a) an aromatic polycarbonate resin, (b) an impact modifying amount of an ABS or ABS type resin and (c) a mold release effective amount of a fluid hydrogenated oligomer of an alpha-olefin.

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## COMPOSITION

BACKGROUND OF THE INVENTION

Useful articles from various thermoplastic resins have been prepared from molds for many years. Injection molding provides a convenient way for preparing various articles from thermoplastic resins, particularly objects of a relatively intricate nature. In order to injection mold articles in an economic manner, the mold resident cycle time should be kept to a minimum. This shorter cycle time provides a shorter resin heat period with consequently less thermal damage to the resin itself and/or less thermal promoted interaction between the resin and various additives present in the resin. In order to accomplish a release of the resin from the mold, various mold release agents have been found which provide for a release of the resin with lower ejection pressure. Such an agent should be chemically compatible with the resin as measured by the usual characteristics of the resin under normal conditions and heat treatments.

Acrylonitrile-butadiene-styrene resins, usually abbreviated as ABS resins, also have a similar problem. Previously ethylenediamine bisstearamide has been incorporated into ABS resins as a lubricant, see USP 3,947,367. A further additive which has been disclosed as having generally a lubricating action and utilized to help increase the moldability of ABS resin are the esters of monocarboxylic saturated aliphatic acids with polyvalent alcohols of high molecular weight, see USP 4,174,325 wherein pentaerythrityltetrastearate was employed. It also has been known to use, in general, mineral oils for the release of certain thermoplastics such as polycarbonate from molds. Such mineral oils are described in Japanese application numbers K53,22556; K79,16559; K72,41093; K80,84353 and GB patent number 2077742. Mineral oils are naturally occurring complex mixtures of hydrocarbons that are obtained from petroleum. Additionally 0.1 to 3.0 weight percent of a mineral oil has been employed to increase the impact strength and improve flowability of an ABS resin, see European Patent Application 177096. These mineral oils are (1) paraffinic in nature with straight or branched chains containing at least 20 carbon atoms, (2) naphthenic or relatively naphthenic - i.e., constituted at least prevailing by saturated, monocyclic, of from 4 to 12 carbon atoms and polycyclic, of from 13 to 26 carbon atom hydrocarbons, or (3) the aromatic oils having a minimum molecular weight around 300. All these oils show a minimum flash point in closed cup, according to ASTM D 93, of 150 °C. However, the resin compositions with the mineral oil are prepared by adding the mineral oil to the actual manufacturing process of the ABS resin. For example the oils are added during the endstage of the grafting reaction or before the coagulation of the latex to the grafted polymer. Therefore the resulting ABS resin composition does not appear to be a mere admixture of the ABS resin and the mineral oil. Rather the oils appear to be at least substantially intermingled during the actual manufacturing process of the ABS resin.

USP 3,759,863, incorporated within, discloses a four component composition of polyvinylchloride, a certain type of ABS, a dialkyltin mercaptide stabilizer and a lubricant which is described as essentially containing hydrocarbons with at least 16 carbon atoms. A mineral oil of hydrocarbons with 20 to 30 carbon atoms, having a boiling range of above 350 °C and a refraction index of  $n_D^{20} = 1.4816$  are preferred.

USP 3,403,120 discloses as a lubricant for ABS a paraffinic, naphthenic or aromatic mineral oils preferably having a certain viscosity range. At least 3 wt.% of the lubricant should be used. The additive is added to the coagulum of the latex of the polymeric components, incorporation inside the anhydrous pellets or by admixing into the latex and then coagulating the latex.

In none of these publications is there an indication that the lubricant was functioning as a mold release agent.

Recently synthetic mineral oils derived from the oligomerization of alpha olefins followed by hydrogenation to remove unsaturation has provided surprising benefit in the area of mold release agents for various materials. Miller et al, USP 4,626,566 described and claims aromatic carbonate polymer compositions and admixture with a hydrogenated alpha olefin oligomer fluid. Additionally USP 4,826,913 discloses the use of such oligomer fluids as mold release effective agents for various other polymers including organic polyesters, poly(arylene oxide)s, poly(arylene sulfide)s, poly(etherimide)s and polysulfones. However to this date there has been no known admixture of these synthetic oligomers fluids with an ABS resin.

A known mold release for polycarbonates and ABS resin is an olefin, see USP 4,399,251.

Blends of polycarbonate and ABS or ABS type resins have been known for many years. Mold release is also an issue with respect to these blends. A recent European patent application EP 248308 has disclosed that polycarbonate ABS blends have a different melt behavior compared to pure polycarbonate. It also discloses that such blends can have enhanced mold release with the addition of an ester of saturated aliphatic C<sub>10</sub>-C<sub>22</sub> carboxylic acids and thihydric alcohol. Pentaerythrityl tetrastearate can also be present.



SUMMARY OF THE INVENTION

In accordance with the invention there is a composition comprising an admixture of (a) an aromatic polycarbonate (b) an impact modifying amount of ABS or ABS type resin and (c) a mold release effective  
s amount of a fluid hydrogenated oligomer of an alpha-olefin.

Another aspect of the invention that the admixture can occur with the already manufactured ABS or ABS type resin.

A further aspect of the invention is the absence or essential absence of polyvinyl chloride and/or a

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